Consequences of Emphasizing Feasibility during Budget-Making Process*

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Abstract

Whether favorable or unfavorable, budget variance, that is, the difference between budgeted performance and actual performance, may result in the inefficient use of resources within a firm. When an organizational unit within a firm incurs a favorable variance, this may seem to be a beneficial situation at the micro-level; however, the firm allocates the unit additional resources that could have been allocated to other units. Alternatively, when a unit incurs an unfavorable variance, the unit likely has idle capacity that does not create value but rather involves wasteful costs. Accordingly, when budget variance occurs, firms face the risk of incurring some kinds of losses. This paper demonstrates that when an owner asks a manager to prepare feasible budgets for avoiding losses due to budget variance, the owner must decrease both the ceilings for the bonus paid to, and target set for the manager.

Keywords
budgeting, budgetary slack, bonus cap, cost of difference, moral hazard

(1) Introduction

This paper shows that budgets are set loosely when owners require that managers prepare feasible budgets by adopting a principal-agent model. Also, this paper notes that owners do not pay bonuses to a manager if his or her performance far exceeds expected targets even though the performance is measured on the basis of budget attainment level.

In many firms, owners communicate budget guidelines to managers and budget drafts are authorized after budget negotiations. Budget guidelines are just rough plans that are then turned into precise drafts through budget negotiations. This paper models such a budget-making process, in which budget guidelines are viewed as representing the distribution of expected profit and managers make effort to narrow the distribution.[1]

Ito (2013) notes that to improve business ability, top management should ask every member of an organization their mission and the way to accomplish it during the planning phase. Building upon this idea, this paper shows that an authorized budget is set loosely if an owner emphasizes the key point stated in Ito (2013).

*I thank two anonymous referees as well as the workshop participants at the 41st JCAA Annual Meeting and Tokyo Keizai University. I also thank the financial supports from JCAA and Tokyo Keizai University.

[1] This paper refers to Chen et al. (2010) for modeling such a budget-making process.

This result parallels Ozawa (2010), which notes that a budget is set below the expected value of performance if inter-departmental coordination is emphasized. However, this paper shows that a budget is set loosely when inter-departmental coordination is not considered, and the budget is not set below the expected value of performance.

Although this paper considers participative budgeting, the focus of this paper is different from other related agency studies (e.g., Heinle et al., 2014). In their models, an agent privately observes a signal and then he reports it to a principal. Since the agent has an incentive to make a false report, these previous studies need incentive compatibility constraints to avoid such a false report. In contrast, this paper analyzes the setting that an owner communicates budget guidelines and a manager makes effort to prepare feasible budgets during a budget-making process, in which the manager has no incentive to make a false report.

Rather, this paper is a moral hazard model since the manager makes effort to prepare a feasible budget. In this regard, this paper parallels Balakrishnan (1991, 1992) and Demski and Sappington (1987). These studies analyze the setting that an agent has an opportunity to acquire information to increase the probability of high performance before operations, and the incentive that a principal gives an agent to acquire such information. However, in the setting of this paper, when a manager makes effort to prepare a feasible budget, the probability of high performance is decreased because the distribution of expected profit is narrowed.

While the preparation of feasible budgets reduces the likelihood of high performance, it may still be beneficial to firms to pursue such a strategy, as it can reduce losses that are incurred from differences between budgeted performance and actual performance. For example, on the one hand, Sharp Corporation reported heavy losses in 2011 due to unused capacity at its Sakai factory. Utilization of capacity at this factory, which was launched in 2009 and is one of the world's largest factories, fell to around 30% in the April-June quarter of 2011 (*Nikkei Sangyo Shimbun*, August 3, 2012). Since actual volume did not attain planned volume despite having set an aggressive target, the firms incurred losses because some of employees and facilities were idle. On the other hand, Suntory Beverage and Foods temporarily halted operations since demand for a certain beverage outstripped its supply and Suntory had to modify its production schedule to ensure a steady supply (*Nikkei MJ*, April 22, 2015). In this case, since the actual volume overwhelmed the planned amount despite conservative target setting, the firm incurred an opportunity loss because some of employees and facilities were idle until it acquired enough resources to deliver a steady supply.

In summary, regardless of whether it is favorable or unfavorable, budget variance increases the risk for losses due to idle capacity. To avoid such losses, firms should prepare feasible budgets, even though doing so decreases the possibility of high performance. For example, Subaru, whose car sales in the United States has been strong, decided to increase its manufacturing capacity with careful attention to an oversupply (*Toyo Keizai Online* [http://toyokeizai.net/articles/-/69095], May 10, 2015). In this case, preparing a feasible budget led to robust performance.

In addition, in many firms, some portion of bonuses to managers are based on their budget achievement. When budgets are formulated in the way noted above, managers have less opportunity to receive bonuses and they do not necessarily narrow the distribution. To encourage managers to do so, firms must adopt a bonus cap, placing a ceiling on bonuses to managers whose performance far exceeds their budget.

The remainder of this paper is organized as follows. Section 2 explains the model of this paper. Section 3 shows the results of both symmetric and asymmetric information cases and Section 4 discusses the results of the analysis. Finally, Section 5 concludes this paper.

(2) Model

This paper considers a budget-making process in which a risk-neutral owner acting as a principal (she), and a risk-neutral profit center manager acting as an agent (he) negotiate on a forthcoming budget. Also, the manager is effort-averse and has no wealth to acquire a firm.

In the budget-making process, a target profit for each profit center is decided based on the firm-wide aspired profit. Hereafter, various kinds of budgets are formulated to realize each target profit, and resources are allocated to each profit center. As stated in the Introduction, regardless of whether it is favorable or unfavorable, the difference between a profit center's actual profit and its target profit is assumed to cause some kinds of idle losses. This paper notates actual profit as x, target profit as h, and the cost of difference, the cost stemming from the difference between the target profit and the actual one, as $\alpha|h-x|$ $(\alpha > 0)$, where the coefficient of the cost of difference α indicates the degree to which the owner recognizes the difference as a loss and decreases the utility of the owner.

Before the budget-making process, the owner communicates budget guidelines to the profit centers. Budget guidelines typically provide only general direction, and this paper chooses to use the distribution of an expected profit, $x \sim \mathrm{U}[m-d_p,\ m+d_p]$, as the main principles in these budget guidelines. This means that although the owner sets a mean target profit m, the guideline has a range from $m-d_p$ to $m+d_p$ based on a set of past profits. Also, this paper assumes that the expected profit is uniformly distributed and both m and d_p are common knowledge.

To decrease the cost of difference, the owner must make a plan that narrows the distribution and reduces business risk (hereafter, risk reduction plan). The owner, however, has scarce time and information and must ask the manager to make the risk reduction plan during the budget-making process. The manager's effort to make the risk reduction plan is assumed to be unobservable by the owner. With the risk reduction plan, the distribution is estimated to be $[m-d_f,\ m+d_f]$ $(d_p > d_f)$; without it, the distribution remains $[m-d_p,\ m+d_p]$.

The owner decides the target profit h in the distribution and pays a bonus calculated using the amount of favorable variance. A favorable variance arises when $h \le x \le m+d_i$ $(i=\{p,\ f\})$, and the average favorable variance is $(m+d_i-h)/2$, since the distribution is uniform. Let the bonus coefficient be denoted as β $(0 \le \beta < 1)$ and the average bonus as $\beta(m+d_i-h)/2$. The probability of a favorable variance is $(m+d_i-h)/2d_i$ and the expected bonus is $\beta(m+d_i-h)^2/4d_i$. Since firms usually cannot pay negative bonuses or decrease fixed salaries when managers incur unfavorable variances, this paper assumes that the bonus payment to the manager is zero when unfavorable variance occurs.[2]

The manager incurs the effort costs of making the risk reduction plan and working in the mid-term. Let the effort costs of making the risk reduction plan and working in the mid-term be denoted as c_1 ($c_1 = \{0, \hat{c}_1\}$, $\hat{c}_1 = \gamma/d_f$, $\gamma > 0$) and c_2 ($c_2 = \{0, \tilde{c}_2\}$, $\tilde{c}_2 = [c_2^{min}, c_2^{max}]$, $c_2^{min} > 0$, $c_2^{max} = \delta^{(d_f+\epsilon)}$, $\epsilon > 0$, $c_2^{min} < \delta^{\epsilon}$), respectively, and $c_1 + c_2 = c$. When $c_j = 0$ ($j = \{1,2\}$) it means that the manager does not incur any effort costs. The distribution remains $[m - d_p,\ m + d_p]$ when $c_1 = 0$, and the actual profit is inevitably $\lim_{\epsilon \to 0} m - d_i + \epsilon$ when $c_2 = 0$. Thus, when $c_2 = 0$, since the probability of a favorable variance is approaching nil, the expected bonus is assumed to be zero for simplicity. In addition, during the budget-making process, $\hat{c}_1$ is certain and a positive constant, and $\tilde{c}_2$ is a random variable. As a result, c is also a random variable, $c \sim N(\bar{c}, \sigma^2)$, and is assumed to be common knowledge.

In addition to bonuses based on performance, employees are paid fixed salaries determined independently of their performance. According to the 2012 survey on work conditions by the Ministry of Health, Labour and Welfare (Shuro Joken Sogo Chosa), fixed salaries are mainly based on the "substance of work" and the "skill of work accomplishment" that indicate an effort cost. During the budget-making process, such an effort cost is uncertain. Accordingly, this paper assumes that the fixed salary S is equal to the expected value of the effort cost $\bar{c}$.[3] Firms have funding constraints and must set a ceiling on payments to employees. So, let this cap be denoted as P^{max} and, for analytical ease, it is assumed that $\bar{c} \leq P^{max}$.

This paper focuses on the budget-making process, and the utility of each player is shown by the expected utility at the beginning of a period. The owner's utility is equal to the residual amount remaining after subtracting the expected cost of difference, the fixed salary and the expected bonus from the expected firm-wide profit, which can be shown as $\mathrm{E}(x - \alpha|h - x|) - [S + \beta(m + d_i - h)^2/4d_i]$. Conversely, the manager's utility is the residual amount remaining after subtracting the effort cost from the fixed salary and the expected bonus. As noted above, the effort cost is uncertain and the manager is also risk neutral. Hence, he evaluates his effort cost as $\bar{c}$ and his utility is $[S + \beta(m + d_i - h)^2/4d_i] - \bar{c}$. Given the assumption on the fixed salary and the effort cost, $S = \bar{c}$, the utility formula is simplified as $\beta(m + d_i - h)^2/4d_i$. In addition, his reservation utility is assumed to be zero.

The timeline of the events in this model is as follows:

1. Owner and manager observe past profits.
2. Owner communicates budget guidelines.
3. Owner decides bonus coefficient and target profit.
4. Manager makes risk reduction plan and works.
5. Profit is realized. Owner and manager acquire payoffs, respectively.

(3) Results

[2] Since this assumption makes limited-liability constraints satisfied, they are omitted in the following analysis.

[3] Although this assumption is surely based on the actual data, it may not be generally accepted. However, the main results of this paper are constant whether the fixed salary is more than the expected effort cost or not. Moreover, to economize space, this paper adopts such an assumption.

1. No Hidden Action

This subsection, as a benchmark, shows the result when the owner can observe the manager's action without any costs. In this case, the manager always makes a risk reduction plan and the distribution is $[m-d_f, m+d_f]$. The problem that the owner solves is as follows.

Problem$^{\mathrm{FB}}$

$$\max_{\beta,h} \mathrm{E}(x-\alpha|h-x|)-\left[S+\frac{\beta\left(m+d_f-h\right)^2}{4d_f}\right]$$

subject to

$$\frac{\beta\left(m+d_f-h\right)^2}{4d_f}\geq 0 \qquad \text{IR}$$

Constraint IR (individual rationality) means that the owner must set the expected utility of the manager at a level greater than the reservation utility. Subsequently, the solution to this problem is as follows.

Lemma. *Suppose that the distribution is uniform,* $x \sim \mathrm{U}[m-d_f,\ m+d_f]$*. When the owner can observe the manager's action, the target profit is the mean of the distribution,* $h^{FB}=m$*, and the bonus coefficient is zero,* $\beta^{FB}=0$*.*

(Proof)

Since IR is satisfied with an equation, the objective function is determined as follows. Note that $S=\bar{c}$ and $h\in[m-d_f,\ m+d_f]$.

$$\begin{aligned}&\mathrm{E}(x-\alpha|h-x|)-\bar{c}\\&=\int_{m-d_f}^{m+d_f}\frac{x-\alpha|h-x|}{\left(m+d_f\right)-\left(m-d_f\right)}dx-\bar{c}\\&=m-\frac{\alpha\left[(m-h)^2+d_f^2\right]}{2d_f}-\bar{c}\end{aligned}$$

Let the target profit and the bonus coefficient be denoted as h^{FB} and β^{FB}, respectively. Since the above function is maximized at $h=m$, $h^{FB}=m$. In this case, the left-hand side of IR is $\beta d_f/4$. However, since the owner can zero out it, we arrive at $\beta^{FB}=0$. ■

The above problem is equivalent to a minimization problem of the expected cost of difference. In addition, $\alpha\left[(m-h)^2+d_f^2\right]/2d_f$ shown in the objective function is the expected cost of difference. It is minimized at $h=m$ and the minimized cost of difference is $\alpha d_f/2$.

2. Optimal Set Budget under Moral Hazard

In this subsection, the result is shown for the case in which the owner cannot observe the manager's actions. In this scenario, in addition to IR, the following incentive compatibility constraints are needed.

$$S+\frac{\beta\left(m+d_f-h\right)^2}{4d_f}-\bar{c} \geq S+\frac{\beta\left(m+d_p-h\right)^2}{4d_p}-\bar{c} \qquad \text{IC1}$$

$$S+\frac{\beta\left(m+d_f-h\right)^2}{4d_f}-\bar{c}\geq S-\hat{c}_1 \qquad \text{IC2}$$

$$S+\frac{\beta\left(m+d_f-h\right)^2}{4d_f}-\bar{c}\geq S \qquad \text{IC3}$$

The left-hand sides of the constraints IC1, IC2, and IC3 show the manager's expected utility when he selects the action the owner prefers. The right-hand side of each constraint shows the manager's expected utility for the following situations: when he does not make a risk reduction plan but works hard in the mid-term (IC1); he makes a risk reduction plan but does not work hard in the mid-term (IC2); and he does not both make a risk reduction plan and work hard in the mid-term.

Having an elaborate plan makes it easier to achieve a desired goal. Similarly, when the manager makes a risk reduction plan, the effort cost of executing operations c_2 is thought to be smaller. Since the risk-neutral manager recognizes the random variable $\tilde{c}_2$ as its mean, we can indicate the mean of $\tilde{c}_2$ when $c_1 = \hat{c}_1$ and the one when $c_1 = 0$ as $\overline{c}_2^1$ and $\overline{c}_2^0$, respectively ($\overline{c}_2^1 < \overline{c}_2^0$). Then, the combined effort cost when the manager both makes a risk reduction plan and works hard in the mid-term is $\hat{c}_1 + \overline{c}_2^1$, and the effort cost when he only works hard in the mid-term is $\overline{c}_2^0$. For ease of analysis, suppose $\hat{c}_1 + \overline{c}_2^1 = \overline{c}_2^0 = c$. As a result, the effort costs shown on both sides of IC1 are identical.[4] Regarding the incentive compatibility constraints, the following result is obtained.

Proposition 1. *When IC1, IC2, and IC3 are satisfied, the target profit does not exist in the distribution after the creation of a risk reduction plan.*

(Proof)

Given the assumption $\hat{c}_1 > 0$, when IC3 is satisfied, IC2 is satisfied with a strict sign of inequality. Also, when it is assumed that $\bar{c} > 0$, the bonus coefficient must be $\beta > 0$ to satisfy IC3. As a result, IC1 is rewritten as follows, $\Delta d = d_p - d_f$,

$$(m + d_f - h)(m - d_f - h) \geq d_f \Delta d.$$

Since $d_p > 0$ and $d_f > 0$, this means that $d_f \Delta d > 0$ and the left-hand side of the above inequality must be strictly positive. Accordingly, the target profit must satisfy any one of the following conditions.

1. $m + d_f - h > 0$ and $m - d_f - h > 0$
2. $m + d_f - h < 0$ and $m - d_f - h < 0$

When the first condition is satisfied, the target profit must be set to strictly less than the lower limit of the distribution since $m - d_f > h$. However, when the second condition is satisfied, the target profit must be set to strictly more than the upper limit of the distribution since $m + d_f < h$. Thus, when IC1, IC2, and IC3 are all satisfied, the bonus coefficient is positive, and the target profit is not set in the distribution after the creation of a risk reduction plan. ■

When the owner seeks to satisfy all of the incentive compatibility constraints, she cannot set the target profit in $[m - d_f,\ m + d_f]$. The manager can expect the above situation and does not make a risk reduction plan. Thus, he would make a dummy plan and just report it. Then, the manager engages in a budget game in which he seeks to maximize his own bonus and minimize the required target by proposing unrealistic numbers during the budget-making process.

However, if the distribution remains $[m - d_p,\ m + d_p]$ and the target profit is not set in $[m - d_f,\ m + d_f]$, the cost of difference may increase. Since the owner can expect such a situation, she must take measures to induce the manager to make a feasible risk reduction plan.

[4] The following numerical example explains this situation. Assume that $c_1 = \{0,1\}$, $\tilde{c}_2 = [1,3]$ when $c_1 = 1$, and $\tilde{c}_2 = [1,5]$ when $c_1 = 0$. Then, $\overline{c}_2 = 2$ when $c_1 = 1$ and $\overline{c}_2 = 3$ when $c_1 = 0$. Thus, in each case, the combined effort cost is $\overline{c} = c_1 + \overline{c}_2 = 3$.

If the manager makes a feasible risk reduction plan, the upper limit of the distribution decreases. Accordingly, if the actual profit is in the range of $(m + d_f, m + d_p]$, it is highly probable that the manager do not make a risk reduction plan. The owner pays no bonus to the manager when the actual profit falls within $(m + d_f, m + d_p]$ to motivate him to make the risk reduction plan. However, if $h = m + d_p$, the manager is not adequately motivated to attain a budget. Hence, the owner must manipulate the bonus coefficient as follows,

$$\begin{cases} \beta > 0, \ if \ h \le x \le m + d_f \\ \beta = 0, \qquad otherwise \end{cases},$$

and IC1 turns out as follows.

$$\frac{\beta(m + d_f - h)^2}{4d_f} \ge \frac{\beta(m + d_f - h)^2}{4d_p} \qquad \text{IC1'}$$

Then, the problem the owner solves is as follows.

Problem^{SB}

$$\max_{\beta,h} \mathrm{E}(x - \alpha|h - x|) - \left[S + \frac{\beta(m + d_f - h)^2}{4d_f}\right]$$

subject to

$$\frac{\beta(m + d_f - h)^2}{4d_f} \ge 0 \qquad \text{IR}$$

$$\frac{\beta(m + d_f - h)^2}{4d_f} \ge \frac{\beta(m + d_f - h)^2}{4d_p} \qquad \text{IC1'}$$

$$\frac{\beta(m + d_f - h)^2}{4d_f} \ge \bar{c} \qquad \text{IC3}$$

Thus, the solution to this problem is as follows.

Proposition 2. *Suppose that the distribution is uniform,* $x \sim \mathrm{U}[m - d_f,\ m + d_f]$ *. When the owner cannot observe the manager's action, the target profit is* $h^{SB} = m$*, and the bonus coefficient is* $\beta^{SB} = 4\bar{c}/d_f$*, if and only if* $4\bar{c} < d_f$*.*

(Proof)

Given the assumption $\bar{c} > 0$, when IC3 is satisfied, IR is satisfied with a strict sign of inequality. In addition, under the assumption $d_f < d_p$, IC1' is also satisfied with a strict sign of inequality. As a result, IC3 is satisfied with a sign of equality. Solving it for h, we find that

$$h = m + d_f \pm \sqrt{\frac{4d_f\bar{c}}{\beta}}.$$

Note that if $h = m + d_f + \sqrt{4d_f\bar{c}/\beta}$, IC3 is not satisfied due to the assumption of the bonus coefficient, $0 \le \beta < 1$. Accordingly, let the target profit in the case of asymmetric information be denoted as h^{SB},

$$h^{SB} = m + d_f - \sqrt{\frac{4d_f\bar{c}}{\beta}}.$$

Substituting it into the objective function, the new objective function is as follows,

$$\max_{\beta} m - \alpha\left[\frac{2\bar{c}}{\beta} - \sqrt{\frac{4d_f\bar{c}}{\beta}} + d_f\right] - 2\bar{c}.$$

Let the solution be denoted as β^{SB}. By first order condition,

$$\beta^{SB} = \frac{4\bar{c}}{d_f}.$$

Substituting it into h^{SB}, we have

$$h^{SB} = m.$$

Given the assumption of the bonus coefficient and IC3, $0 < \beta < 1$, this means $0 < 4\bar{c}/d_f < 1$. Thus, the above solutions for β^{SB} and h^{SB} are derived if and only if $4\bar{c} < d_f$. ■

The cost of difference expected at the beginning of a period is $\alpha\left[(m-h)^2 + d_f^2\right]/2d_f$ and is specified by α (the degree to which the owner recognizes the cost of difference as a loss), h (target profit), and m and d_f (mean and deviation of the distribution, respectively, after the creation of a risk reduction plan). Since α and m are exogenous variables, the owner seeks to minimize the cost of difference by manipulating h and d_f. Whether there is symmetric information or asymmetric information, both the distribution and the cost of difference are not changed. Accordingly, the target profit is the mean of the distribution in each case. However, since it is practically impossible to eliminate uncertainty, which means $d_f = 0$, the lower limit of the distribution must be $4\bar{c} < d_f$.

By the assumption $\hat{c}_1 = \gamma/d_f$, as d_f is approaching zero, the effort cost of making a risk reduction plan $\hat{c}_1$ is exponentially increasing. Also, if d_f could be close to zero, the uncertainty on the effort cost in the mid-term $\tilde{c}_2$ would not be dispelled. Furthermore, by the assumption $c_2^{max} = \delta^{(d_f+\epsilon)}$, even though d_f is approaching zero, c_2^{max} is only gradually decreasing. In sum, as d_f is decreasing, $\hat{c}_1$ is increasing but $\tilde{c}_2$ is difficult to decrease, and $\bar{c}$ is increasing. Therefore, d_f depends on $\bar{c}$ as stated in Proposition 2, and we find that $4\bar{c} < d_f$. In the case of symmetric information, the lower limit of d_f is the level at which $S = \bar{c}$ and $\bar{c} \leq P^{max}$ are satisfied.

The reason why the lower limit of d_f is strictly more than $4\bar{c}$ is that the owner must pay a bonus to the manager in the case of asymmetric information. As d_f decreases, the range in which the bonus coefficient β is positive is narrowing and the bonus base for the manager is decreasing. This means that the manager must decrease his own expected utility by making a risk reduction plan that involves both an increase in effort cost and a decrease in his expected bonus. To reward the manager for increasing effort cost, the owner must pay the manager a bonus that exceeds the acquired profit by setting $\beta > 1$. This does not pay the owner, and she sets the lower limit of d_f as $4\bar{c} < d_f$.

The expected bonus for the manager in the case of asymmetric information is equivalent to information rent under moral hazard and the owner encounters a trade-off between decreasing the cost of difference and increasing the manager's bonus. Avoiding the diseconomy of decreasing the owner's payoff by increasing the manager's bonus exceeds the increase of her payoff by decreasing the cost of difference; the lower limit of d_f is needed.

As a result, the manager's bonus base is secured and the target profit is equal to the mean of the distribution. This means that the owner prefers a budget that easily causes favorable variances or gives the manager information rent. Agency theory has highlighted asymmetric information and opportunistic agent(s) as the reason that a principal must leave information rent (e.g. Antle and Eppen, 1985). In addition to the above factors, the analysis of this paper reveals that the reduction in the cost of difference causes information rent and the owner desires it.

(4) Discussion

This paper shows that the owner desires feasible budgets by adding the cost of difference into her utility function. Moreover, from the analysis of the previous section, we have the following result: if the owner seeks to decrease the cost of difference, (1) the bonus paid to the manager should be capped, and (2) the target set for the manager should be loosed. This section examines the above two points.

1. Rationality of Bonus Cap

A bonus cap, sometimes referred to as a bonus scheme (e.g., Healy, 1985), has been criticized in some studies (e.g., Hope and Fraser, 2003). Also, some other studies have advocated a liner incentive scheme (e.g., Jensen, 2001, pp. 98-99; Stewart, 1991, pp. 233-241). To be sure, managers strive to maximize their profits if a liner incentive scheme is adopted and this is seemingly favorable. However, managers take the risk to proceed with their operations in an infeasible direction if such a scheme is adopted, and their strategy is unfavorable in terms of minimizing the cost of difference. In fact, some firms pursuing profit maximization decline in earnings due to over-investment. For example, Sumitomo Corporation, which rapidly expanded its natural resources businesses, was then required to book huge impairment losses because the capital invested in the businesses was deemed irrecoverable (*Nihon Keizai Shimbun*, September 30, 2014). Also, Mitsubishi Motors decided to cease its factory operations in the U.S. and aggregate its production capacity in its Okazaki factory. It was reported that this decision would make the Okazaki factory operate at nearly 100% capacity (*Nihon Keizai Shimbun*, August 21, 2015), which makes this nothing less than effort to decrease the cost of difference, so-called idle capacity.

However, as stated in the interpretation of Proposition 1, if the owner sets a cap on the bonus paid to the manager, he is not motivated to maximize profit. As criticized by Hope and Fraser (2003) and Jensen (2001), the bonus cap carries the risk of causing dysfunctional behavior from having employees not earn profit that exceeds the upper limit of bonus bases. Although the bonus cap helps avoid the problem caused by over-investment or out-of-production capital, it creates opportunity costs, that is, the profit lost by the bonus cap. In sum, the choice of whether to set a bonus cap mirrors the trade-off when deciding whether to pursue profit maximization or avoid the cost of difference.

However, paying attention to the cost of difference has the advantage of decreasing the cost of capital in addition to avoiding over-investment. Public companies listed in Japan are required to disclose earnings forecasts, and Muramiya (2005) noted that accurate forecasts contribute to a decrease in the cost of capital. Also, since such forecasts are based on budgets (Yanagi, 2011, pp.72-88), ordering the manager to make a risk reduction plan during a budget-making process and motivating him not to attain excessive favorable variance by using a bonus cap improves the accuracy of disclosed forecasts, which then contributes to decreasing the cost of capital. In the setting of this paper, if a budget is formulated around the upper limit of the expected profit distribution and the earnings forecast is disclosed based on the budget, it is inevitable that the forecast gets revised downward. For example, Sony lowered its forecast for 2014 several times, which was accompanied by a fall in its stock price. It was noted that Sony's top management required ideal goals even though Sony's division managers submitted secure quantitative plans (*Nikkei Sangyo Shimbun*, November 5, 2013).

In addition, several firms set a ceiling on executives' bonuses, and it has been said that executives in such firms conduct earnings management so that the estimated profit is intentionally lowered to the ceiling when the profit is expected to exceed it (e.g., Healy, 1985). If such firms do not set a ceiling on managers' bonuses, executives would conduct reckless earnings management because managers pursue high profit to maximize their own bonuses. However, executives do not prefer this type of earnings management due to concerns about backlash against future earnings. Accordingly, executives must guide managers not to yield profit to such a degree when executives conduct earnings management. Thus, a bonus cap that does not pay a bonus for excessive favorable variance helps prevent the reckless earnings management.

It has generally been thought that the reason why firms set a ceiling on bonuses is a funding constraint. In addition to such a constraint, this paper shows that a bonus cap can help a firm avoid losses caused by over-investment, prevent an increase in the cost of capital following the revision of earnings forecasts, and prevent reckless earnings management.

2. Rationality of Budgetary Slack

As stated in the interpretation of Proposition 2, the owner aims to set the profit target at a level that the manager easily attains. In this subsection, we examine the effectiveness of such a target in terms of tightness. It has been suggested that a tight target is challenging but attainable (e.g., Anthony and Govindarajan 2007, p.391). Merchant and Manzoni (1989), surveying the profit center managers on the ex-ante subjective probability of attaining their targets, conclude that the target they can achieve with a probability of more than 50% is rational. Also, Anthony and Govindarajan (2007) support this conclusion concerning the tightness of the target. Now, turning to Proposition 2, since the target is set at the mean of the expected profit distribution, the probability of target achievement is 50%. Therefore, this indicates the validity of Proposition 2 although we cannot simply compare Merchant and Manzoni (1989) and this paper.

Furthermore, if the owner does not regard the cost of difference as a loss, she would hike a target to the upper limit of the distribution to minimize the bonus paid to the manager. In other words, depending on whether the cost of difference is regarded as a loss, the tightness of the target is subjective. Even though the portion that the target is lowered from the upper limit of the distribution is not changed, one person may view the target as tight, whereas another may not, or may view it as including budgetary slack. For example, even if executives set a tight target, rational stockholders who adequately spread risk would likewise not deem it as tight. The same holds for conglomerates the higher people advance in hierarchy, the more they do not regard the cost of difference as a loss, but rather view a target as including budgetary slack because the risks they face are dispersed. Budgetary slack is contingent on some kinds of subjective judgement (Kosuga, 1997, pp.196-198). This paper shows that the degree to which the cost of difference is regarded as a loss is one such subjective factor.

Budgetary slack has been thought of as the portion that managers intentionally lower budgets from attainable levels to maximize their own bonuses. When a target is set as stated in Proposition 2, a manager can acquire his bonus. Accordingly, the budget formulated as stated in Proposition 2 might be viewed as one that includes budgetary slack. However, this kind of budgetary slack is not the portion a manager intentionally lowers but the one an owner purposefully accepts. The reason why the owner accepts budgetary slack is that she expects the decrease in the cost of difference to restore firm management. In other words, budgetary slack is considered to act as an essential part of managing a firm.[5] Although there have already been several studies showing the advantages of budgetary slack (e.g., Dunk, 1995), this paper shows that budgetary slack contributes to a reduction in the cost of difference, which is a benefit of budgetary slack that has not been mentioned in previous studies.

(5) Conclusion

This paper examines the features of a budget-making process where the owner seeks to formulate a feasible budget. Also, this paper notes that a bonus cap and a certain level of budgetary slack are needed when the bonus is based on the degree of budget attainment.

Both bonus caps and budgetary slack have been criticized as causing a loss to firms. In contrast, this paper reveals that bonus caps and budgetary slack have the benefit of decreasing the costs of difference in some areas such as idle capacity, acquisition of additional resources, increase in the cost of capital, and excessive earnings management that are caused by the difference between budgeted performance and actual performance.

Empirical research on the results derived from the analysis of this paper should be conducted in future research. Some cases stated in this paper can be seen as only representing relevant cases in which firms understated the cost of difference. There must be other firms that pay attention to the cost of difference and some such firms must achieve better performance than others. To understand the overall trends, it is necessary to verify the characteristics on financial statements depending on whether a firm recognizes the impact of the cost of difference.

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[5] Such budgetary slack is equivalent to the well-functioning budgetary slack noted in Ri et al (2012).

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(Received: August 25, 2017)
(Accepted: October 22, 2017)